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METHOD FOR MANUFACTURING CARAMELS CONTAINING PALATINOSE

[Parachino su wo gan'yusuru kyarameru no seizoho]

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Claims

1. Among methods for manufacturing caramels, methods characterized by the fact that they have processes wherein after mixing caramel starting materials and heating and concentrating, the caramel paste is cooled to a temperature at which palatinose microcrystals will not disappear, and palatinose microcrystals are added and mixed.

2. Methods described as in Claim 1 wherein after adding and mixing the palatinose microcrystals, the caramel is cooled and immediately molded, cut and packaged.

3. Methods described as in Claim 1 or 2 wherein the caramel paste essentially contains no wheat flour.

4. Methods described as in any one of Claims 1-3 wherein the caramel paste essentially contains no sucrose or starch syrup and contains palatinose.

5. Methods described as in any one of Claims 1-4 wherein the palatinose microcrystals are added in the form of fondant containing palatinose microcrystals.

6. Methods described as in Claim 5 wherein the fondant containing palatinose microcrystals is one wherein after mixing the palatinose with other sugars and cooking them down, it is cooled below temperatures at which palatinose crystals melt, trace amounts of palatinose powdered sugar or crystals are added as seed crystals, and at least a portion of the palatinose is deposited as crystals while stirring.

7. Methods described as in Claim 5 or 6 wherein the fondant is made mainly of palatinose, 42-72 wt%, along with other sugars and water.

8. Methods described as in any one of Claims 5-7 wherein the fondant containing palatinose microcrystals is added in amounts of 6-21 wt% (solids) with respect to caramel weight.

9. Methods described as in any one of Claims 1-8 wherein a total of 11-49 weight % (solids) of palatinose with respect to caramel weight is contained in the caramel.

10 Caramels that have palatinose, non-palatinose sugars, milk proteins and fats and oils as the main components, provided that at least a portion of the palatinose is in microcrystalline form, and that essentially contain no sucrose, starch syrup or wheat flour.

Detailed explanation of the invention

Industrial application field

This invention pertains to caramel manufacturing methods. More specifically, it pertains to caramel manufacturing methods that utilize the unique properties of palatinose, which is a kind of sugar.

Prior art

During the Showa 20s [1945-1954], in terms of manufactured quantities, caramels were king among Western confections. But since then, confections have diversified. Additionally, it came to be said that of all confections, caramels most easily lead to cavities, and their production quantities thus decreased rapidly. The usual caramels have table sugar, starch syrup, milk, condensed milk, butter (hardening fats and oils), wheat flour, seasonings, etc. as starting materials. These substances each assume important roles and create delicateness with body, color and texture. Previous methods for manufacturing milk caramels placed, of the above starting materials, milk, table sugar and appropriate amounts of water in a preparation tank with attached stirrer and heated them. Next, the starch syrup and, finally, the condensed milk and wheat flour, kneaded together, were added. The mixture was heated to 60°C to mix the various starting materials together thoroughly and improve the flavor. This was sent to a storage tank and uniform quantities were sent to a reduction kettle. Here, the mixture was cooked down to a product temperature of 118-122°C. Butter was then added. Seasonings were added after heating was stopped, and the mixture was well mixed. It was cooled to an appropriate temperature by passing cold water through the jacket and sent

out onto a cooled conveyor. After this, the thickness was made uniform by passing it through a rolling machine, the mixture was cut to prescribed size with a cutter and packaged to make product.

In the composition of caramel starting materials, table sugar and starch syrup are, of course, the sweetening components. Table sugar also is deposited as crystals in cooling processes and is an assistant in giving shape to the caramel paste. If the amount of table sugar is too large, however, large amounts of crystals are produced, and the texture becomes one that ruptures easily. On the other hand, if there is too much starch syrup, the mixture absorbs moisture and tends to dissolve.

Wheat flour contributes to formability of the caramel paste and to shape retention of the caramel product. Wheat flour also serves to improve chewability and absorb excess oils. Formability in these specifications refers to the property that deformation does not occur in caramel cooling, molding, cutting and packaging processes. Shape retention refers to the property that the product does not deform over time due to its own weight. Texture refers to appropriate feel of the caramel, such as plasticity, viscoelasticity, etc., when eaten.

As above, in caramels of the past, table sugar, starch syrup and wheat flour were essential components. If one, two or more of these are eliminated, the quality of the caramel product worsens and modifications in manufacturing processes must also be studied.

Purpose of the Invention

The purpose of this invention is to present caramel manufacturing methods and caramels that differ completely from the past.

The starting point of this invention was in making caramels without using sucrose or starch syrup in order to make caramels that do not cause cavities. For this reason, palatinose that has been drawing

attention in recent years as an anti-tooth-decay sugar will be used. And to improve caramel flavor, another goal is to make caramels without using wheat flour.

As has been known from the past that caramel formability, shape-retention and texture are realized by a balance of sucrose, starch syrup, wheat flour as well as milk protein and fats and oils, when the inventors tried to make caramels by prior methods using palatinose alone instead of sucrose and starch syrup and eliminating wheat flour, significant problems in terms of formability, shape-retention and texture occurred. This invention presents novel caramel manufacturing methods and caramels that do not have these problems.

Organization of the invention

The above purpose of this invention is achieved after heating and concentrating caramel paste according to the usual methods, by cooling the caramel paste to temperatures at which palatinose microcrystals do not disappear and then adding and mixing palatinose microcrystals.

In this invention, it is believed that the palatinose microcrystals are uniformly dispersed and present as crystals in the caramel paste and in cut and packaged caramel products and maintain caramel paste formability and product shape-retention. Consequently, in this invention, caramels can be made without using the wheat flour that had been indispensable for formability and shape retention in the past. Palatinose microcrystals also give an appropriate texture to the caramels. Because a texture that ruptures easily is obtained if there are many crystals and the texture becomes glutinous if there are few crystals, the texture can be adjusted appropriately as desired. Palatinose itself is a well-known substance. It is a sugar that is obtained by allowing glucosyl transferase to act on sucrose and has a favorable sweetness that is similar to sucrose. In recent years, it has come to be known as not causing cavities. Methods for its manufacture are described, for example, in the Patent Journal for Kokai Patent No. Sho 57 [1982]-39794,

In order to add palatinose microcrystals to caramels, using a fondant that contains the palatinose microcrystals is favorable. By this, workability during manufacture and smooth texture are obtained. Methods for manufacturing fondant containing palatinose microcrystals are described in the Patent Journal for Kokai Patent No. Sho 57 [1982]-58852. Favorable manufacturing methods are methods wherein, after mixing palatinose with other sugars and cooking them down and cooling to below temperatures at which the palatinose crystals melt, trace amounts of palatinose powdered sugar or crystals are added as seed crystals and at least a portion of the palatinose is deposited as crystals while stirring. For other sugars here, low-tooth decay sugars such as reduced malt sugar, sorbitol, isomaltitol, gluco-pyranoside-1,6-mannitol, maltose, coupling sugar, fructo-oligosaccharide, reduced palatinose, etc. can be cited. But they are not limited to these. It is also possible to use sucrose or malt sugar, but is unfavorable from the standpoint of preventing cavities. A particularly favorable other sugar is so-called palatinose syrup, that is, a syrup obtained by de-coloring and concentrating the solution with ion exchange resin after glucosyl transferase has been allowed to act on sucrose solution and the palatinose produced has been removed as crystals. In addition to about 20 wt% solubilized palatinose, it contains about 80 wt% of sugars such as trehalose, fructose and glucose. Preferably, the fondant contains 42-72 wt% palatinose, and it is preferable that the palatinose fondant is added in amounts of 6-21 wt% with respect to the total weight of caramel. If it is less than this, formability and shape retention are poor, and if it exceeds this, texture and flavor worsen. Although it is possible to use palatinose powdered sugar instead of palatinose fondant, uniform mixing during manufacture is difficult and texture becomes coarse.

Before adding the palatinose microcrystals, it is necessary to reduce the temperature of the caramel paste. If not, the palatinose microcrystals disappear, and the purpose of adding the palatinose in the form of microcrystals is lost. Although this cooled temperature differs with caramel paste composition, it is generally 80-60°C, preferably around 70°C if workability is also taken into consideration.

In this invention, it is preferable that the caramel paste before adding the palatinose microcrystals in the form of palatinose fondant consists mainly of palatinose, other non-sucrose sugars, milk protein and lipids. That is, favorable pastes essentially do not contain sucrose, starch syrup or wheat flour, because the palatinose in said pastes is melted during heating and stirring, they are no longer in the form of crystals. Since unlike sucrose, crystallization of palatinose is slow, crystals are not deposited immediately when the caramel paste is cooled. Therefore, according to this invention, there is a need to add palatinose microcrystals in a separate process for good formability, shape retention and texture. Because such caramels do not contain sucrose or starch syrup, they have the strength that they do not cause cavities. It is preferable that the total amount of palatinose contained in the caramel paste before addition of the palatinose microcrystals and palatinose contained in the palatinose fondant is 11-49 wt% with respect to total caramel weight. For the above other non-sucrose sugars, the low-tooth decay sugars and palatinose syrup described above with regard to manufacture of palatinose fondant can be cited. The use of palatinose syrup is particularly favorable.

To give a typical example of a caramel manufacturing process of this invention, after mixing and melting caramel starting materials consisting mainly of palatinose, other sugars, milk protein and lipids, a first concentration is performed under reduced pressure. Next, at normal pressure, the material are concentrated while heating to around 120°C, for example, 117 to 118°C. Then, the temperature of the paste is lowered to about 70°C. Palatinose fondant is added and thoroughly stirred. Then after cooling, [it] is immediately molded, cut and packaged to obtain product. Since sucrose crystallization does not occur as in previous caramels in this invention, there is no need to leave time for crystallization. And since very good formability is obtained, despite wheat flour and sucrose not being included in the caramels of this invention, the caramels produced can be molded and cut immediately. Since shape retention is very good, the shape of the product also does not change.

Effect of the invention

This invention has presented caramels and methods for their manufacture that differ completely from the past.

That is, by adding palatinose microcrystals, palatinose caramels having good formability, shape retention and texture have been obtained. Since formability is good, the caramel paste produced can be molded and cut immediately after cooling.

And since the caramels of this invention do not contain wheat flour, taste has been improved.

Since the caramels of this invention do not contain sucrose or starch syrup, they rarely cause cavities.

As above, this invention has brought about significant progress in caramel manufacturing processes and the quality of the caramels themselves. Below, this invention will be explained further using application examples. "Parts" in the application examples are parts by weight and "%" is wt%.

Application examples

The fondants containing palatinose microcrystals used in the application examples were made as follows.

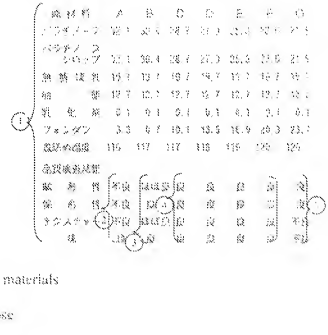
Palatinose crystals were added to hot water. The palatinose syrup, or various other sugars described above, was added to this and stirred, heated, and melted and cooked down until it reached 114°C. This was stirred with a high-powered stirrer and, when it reached a temperature of 40°C, trace amounts of palatinose powdered sugar were added. Stirring was continued to deposit crystals and [the mixture] was stored in containers to allow complete deposition of palatinose microcrystals.

The sugarless condensed milk used in the application examples contained 28.1% solids.

Application Example 1

Caramels were manufactured from palatinose, palatinose syrup as other sugar and palatinose fondant in the following blending ratios (weight ratios of solids). After concentrating starting materials other than the fondant under reduced pressure using a cooker, [they] were heated and concentrated under normal pressure to the following reduction temperatures (°C). The concentrates were transferred to a stirrer with attached jacket and cooled to 70°C while stirring. Then the fondant was added and after stirring for another 20 min at 70°C, [the mixtures] were poured onto cooling trays, rolled to a thickness of 1 cm with rollers, cut into soybean-shapes and packaged. After leaving the finished products at room temperature for 1 day, they were taste-tested, and texture and flavor were evaluated. It was found that when taste-tested after leaving for 30 days, the same ratings were obtained.

For the fondant, one of 45% palatinose, 45% palatinose syrup (solids), and 10% water was used.



Key 1 Starting materials

Palatinose

Palatinose syrup

Sugarless condensed milk

Fats and oils

	Emulsifier	
	Fondant	
	Reduction temperature	
	Quality test results	
	Formability	
	Shape retention	
	Texture	
	Flavor	
2	Poor	
	Poor	
	Poor	
	Good	
3	Almost good	
	Good	
	Almost good	
	Good	
4	Good	
5	Good	
	Good	
	Poor	
	Poor	

If there was too little fondant, formability and shape retention were poor, texture was sticky and [the caramels] stuck to the teeth. On the other hand if there was too much fondant, viscoelasticity was lost, and the feel of the caramel when eaten was worsened. In terms of flavor, when there was too much fondant, it was difficult to bring out milk flavors, etc., and the sense of an integrated flavor was worsened.

From the above results, 6.7%-20.3% solids was appropriate for the amount of fondant added during caramel manufacture; 10.1%-16.9% was more preferable. Almost the same results were obtained when, instead of the palatinose syrup, equal amounts as solids of reduced malt sugar, sorbitol, coupling sugar, fructo-oligosaccharide, or reduced palatinose were used. Sucrose can be used instead of the palatinose syrup, but it is not appropriate for palatinose caramels that are intended to be non-tooth-decaying caramels.

Application Example 2

To study the ease/difficulty of addition to the caramel paste and effects on the caramel texture of fondant properties, the following 7 kinds of fondant were made.

Fondant composition

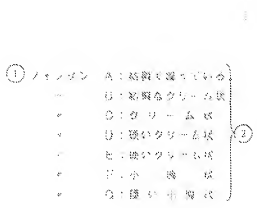
		A	B	C	D	E	F	G
①	パラチノース	30.9	42.0	34.6	60.0	72.9	76.5	78.6
	還元麦芽糖	52.8	47.7	35.4	20.3	17.9	13.5	12.0
	水	16.3	10.3	30.0	19.7	10.1	10.0	9.4

Key: ① Palatinose

Reduced malt sugar

Water

Fondant properties



Key: 1 Fondant ____:

2 A: thick and muddy

B: thick and creamy

C: creamy

D: firm and creamy

E: firm and creamy

F: small lumps

G: hard, small lumps

13.5% solids of the various fondants were kneaded into caramel paste wherein blended starting materials comprising as solids 32.4% palatinose, 21.6% powdered reduced malt sugar, 19.7% sugarless condensed milk, 12.7% iso-cacao oils and fats, and 0.1% emulsifier had been cooked down to 118°C in a kettle. The results were as follows.

	A	B	C	D	E	F	G
Formability	Poor	Somewhat good	Good	Good	Good	Good	Good
Shape retention	Poor	Somewhat good	Good	Good	Good	Good	Good
Texture	Poor	Good	Good	Good	Good	Somewhat good	Poor

Flavor	Good	Good	Good	Good	Good	Somewhat good	Poor
Mixability	Good	Good	Good	Good	Good	Somewhat good	Poor

From the above results, the fondant being hard was unfavorable because kneading into the caramel was difficult and left small lumps of fondant in the product. If it was too soft, the amount of crystal was too low and was not suitable for maintaining the shape of the caramel. The amount of palatinose in the fondant being 42%-72% was favorable; 54%-72% was more favorable. The results were the same when the powdered reduced malt sugar was replaced with palatinose syrup, sorbitol, coupling sugar, fructo-oligosaccharide, reduced palatinose, etc. In the case of palatinose syrup, the palatinose in the syrup had to be incorporated into the palatinose amount.

Application Example 3

Caramels of the blends of solids shown in the following table were trial-manufactured varying the amount of palatinose used in the caramel paste. For the fondant, one of 55% palatinose, 32% powdered reduced malt sugar and 13% water was used. Consequently, the amount of palatinose in the fondant was 63% solids.

Caramel starting material blend

Key: 1 Palatinose

Reduced malt sugar

Sugarless condensed milk

Fats and oils

Emulsifier

Fondant

Caramel property test results

	A	B	C	D	E	F	G
Formability	Poor	Somewhat good	Good	Good	Good	Good	Good
Shape retention	Poor	Good	Good	Good	Good	Good	Good
Texture	Poor	Somewhat good	Good	Good	Good	Somewhat good	Poor
Flavor	Good	Good	Good	Good	Good	Good	Poor

From the above results, caramel manufacture was possible when palatinose content was 11.4%-48.2% of total caramel solids. Preferably it was in the range of 18.2%-38.2%.

Application Example 4

Using the following blend (starting material weight ratio), caramels were made by the manufacturing method given in Application Example 1. The palatinose fondant was one made with proportions of 44 parts palatinose and 56 parts palatinose syrup.

Palatinose	40 parts
Palatinose syrup	56 parts
Sugarless condensed milk	104 parts

Interesterified fats and oils	18.8 parts
Emulsifier	0.15 parts
Fondant	23.3 parts

The caramels produced had good formability and shape retention. Feel in the mouth was also good, and they were favorable with good milk flavor.

Application Example 5

After 5 kg of the blend of the following starting material weight ratios were concentrated under reduced pressure using a 5 liter vacuum cooker and was concentrated under atmospheric pressure to 116°C. The concentrate was transferred to a stirrer with attached jacket and cooled to 70°C while stirring. Fondant was added and stirring was continued for another 20 min. This was poured onto a cooling tray and rolled to a thickness of 1 cm with a roller and cut into soybean-shape.

Starting material	Amount blended
Palatinose	20 parts
CN	24 parts
Sugarless condensed milk	36 parts
Butter	6 parts
Emulsifier	0.15 parts
Fondant	23.3 parts

In the table, CS is BX75 coupling sugar. The fondant was made with proportions of palatinose: CS = 52:48 and containing 12.5% water. The caramels produced had excellent formability and shape-retention. Feel in the mouth was also good, and they were favorable with good milk flavor.

Application Example 6

Caramels were made according to Application Example 5 with the following starting material weight blend ratios. Concentrating temperature was 115°C and, instead of the fondant, palatinose powdered sugar of about 20 μ grain size was used.

Palatinose	40 parts
Palatinose syrup (BX71)	70 parts
Sugarless condensed milk	104 parts
Iso-cacao oils and fats	18.8 parts
Emulsifier	0.15 parts
Palatinose powdered sugar	10 parts

The formability, shape retention and texture of the caramels produced were very good. In terms of feel in the mouth, however, a grittiness of the powdered sugar was felt.